

TESTING *XYLELLA FASTIDIOSA* PATHOGENESIS MUTANTS IN *ARABIDOPSIS THALIANA*

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ABSTRACT

The bacterium *Xylella fastidiosa* (*Xf*) causes Pierce's disease and a number of other plant diseases of significant economic impact. To date, progress determining mechanisms of host plant susceptibility, tolerance or resistance has been slow, due in large part to the long generation time and limited available genetic resources for grape and other known hosts of *Xf*. To overcome many of these limitations, *Arabidopsis thaliana* has been evaluated as a model host for *Xf*. A pin-prick inoculation method has been developed to infect *Arabidopsis* with *Xf*. Following infection, *Xf* multiplies robustly and can be detected by microscopy, PCR and isolation. Affymetrix ATH1 microarray analysis of inoculated vs. non-inoculated Tsu-1 reveals gene expression changes that differ greatly from changes seen after infection with apoplast colonizing bacteria. Many genes responsive to abiotic stress are differentially regulated while classic pathogenesis-related (PR) genes are not induced by *Xf* infection. The *Arabidopsis* ecotype Tsu-1 was inoculated with the *Xf* mutants *tolC*, *pglA*, and *rpfF* and their corresponding wild-type parents. The *tolC* mutant did not grow in *Arabidopsis* and no live cells were recovered, which is similar to results from *tolC* infection of grapevine. The *rpfF* mutant did grow to higher titer, again similar to growth in grape. However, growth of the *pglA* mutant was indistinguishable from that of the corresponding Fetzner wild type; this contrasts with the situation in grape where *pglA* is hypervirulent. It may be concluded that *Xf* growth in *Arabidopsis* is not enhanced by a functional polygalacturonase protein, perhaps because of differences in xylem and pit membrane structure between grape and *Arabidopsis*. Because two of the three mutants tested (*tolC* and *rpfF*) did behave similarly in *Arabidopsis* and in grape, it appears that *Arabidopsis* is an informative model host for the evaluation of at least some *Xf* mutants.

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